

TECHNICAL ADVISORY COMMITTEE

Preliminary Recommendations

The Technical Advisory Committee recommends:

1) Establishment of a Central Facility for Advanced Mine Training and Repository for Specialized Equipment. The facility would primarily serve the underground coal mines in Utah and possibly Colorado and Wyoming but could ultimately serve other mining operation in Utah and the intermountain west. It is proposed to locate the facility at the Western Energy Training Center (WETC) near Helper, Utah, which is within a maximum of two hours from existing Utah coal mines and within five hours of underground coal mines in Colorado and southwest Wyoming. The purpose of the Central Facility would be: (a) Provide classroom and fieldwork space for advanced emergency response training for industry stakeholders including executive management. (b) Provide training in emergency preparedness for community and agency support networks for the mining industry. (c) Provide specialized equipment that would be identified and recommended for purchase or lease, and could be used by all participating mines. The Central Facility should be directed by a steering committee charged with on-going development and management of programs for disaster prevention, testing and certification of underground personnel (mine foreman and fireboss), mine emergency preparedness, and mine recovery. The members of this committee should be appointees, not volunteers, and should possess the qualifications to develop appropriate programs, evaluate effectiveness of training, and manage budgets and contracts.

The focus and intent of the Central Facility is to provide expert personnel and required equipment to enhance accident prevention training and to prepare and act effectively if and when emergencies occur. It is not intended to replace mandated training and equipment that must be provided by the operators at their respective mines. Examples of services that may be of benefit include but are not limited to:

- Emergency preparedness planning and use of specialized equipment.
- Mine emergency response training for managers
- Gas analysis and mine atmosphere interpretation.
- Portable nitrogen plant and training for injection services.
- Jet engine and training in its use for producing inert mine atmospheres.
- Specialized tunneling equipment and support structures for reopening collapsed areas.

Further it is proposed to create a working group within the Technical Advisory Committee to identify vendors who can supply the necessary services and equipment. The working group is to meet with potential vendors, determine capabilities, determine willingness to locate at WETC, evaluate long-term commitment, and estimate costs to retain services. The group is also to evaluate the costs/benefits of having a contractor provide the equipment and services versus hiring dedicated personnel and purchasing equipment using State funds. The findings of the working group are to be reported to the Commission with a recommendation for initial and ongoing costs.

2) Establishment of a Research Institute for Mine Safety and Productivity (RIMSP). This institute would restore funding that was once provided by Mineral Leasing revenues for research into improved safety and economic recovery of coal resources. The U.S. Bureau of Mines was eliminated in 1995, and support of individual mining-related research projects from State Mineral Leasing Funds was terminated in 1999. Since then little funding has been available to academic institutions for research to serve the coal industry of the western states. Establishing

an Institute with funding from the State would assist development of improved methods for mining under deep cover and/or unusual conditions. Having a recognized Institute working closely with industry would make it easier to attract additional funding from other sources such as NIOSH, DOE, and BLM. Once established, the Institute may expand to include other minerals resources in the State assuming financial support from appropriate sponsors becomes available.

Individual research programs should be relevant to the Utah mining industry and focused on safety and optimum resource recovery. They would be selected on the basis of competitive, peer-reviewed proposals. Funds should be administered by a board consisting of representatives from industry and academia, and others with vested interests in a safe and productive mining industry. The board could work closely with the Central Facility steering committee (Recommendation 1) to identify appropriate research topics. The objectives and general areas for research would be generated by the board, who would issue regular solicitations for proposals and consider unsolicited proposals. Individual projects could include development of new mining methods, ability to detect changes in mine stress, planning ventilation systems, simulating mine fires, seismic monitoring of specific operations for research purposes, creation of a specialized information base for best practices in bump-prone environments, modification of mining machinery for safer operation, more sophisticated technology for locating miners following an accident, and improved planning tools. Programs similar to this are in operation in other coal-producing states - for example Illinois.

It is proposed that this effort initially be funded at \$1 million. Redirecting funds from existing Mineral Leasing revenue would be appropriate. Alternatively a levy could be imposed on electrical energy produced by coal (example 1¢/100kwh would produce over \$3 million, equivalent to about 75¢ per year for an average family). Support could be supplemented by industry and federal research funds.

3) Upgrading seismic monitoring coverage of the coal-mining region of Central Utah.

There presently exists a one-time opportunity to acquire for permanent use several existing high-quality, three-component broadband seismometers with associated signal processing, power, and communications equipment. The "USArray" is part of a National Science Foundation research effort known as "Earth Scope." This project is designed to detect small and large earthquakes, which will lead to a better understanding of earth's structure, dynamics and the physical processes controlling earthquakes and volcanoes. The "Transportable Array" of Earth Scope includes 400 broadband seismometers. They are being installed on a 70-km grid starting on the west coast of the United States and will move eastward in a leapfrog fashion (relocation every 18 - 24 months), ultimately establishing 1,600 observation points over a period of about six years. Rather than moving individual installations, it is possible for regional networks, educational institutions, or other entities to acquire fully operational stations. This program enables adopting organizations to gain an asset at significant savings.

It is proposed to adopt three stations already in Central Utah so that the University of Utah Seismograph Stations' regional network can continue to detect and analyze events at existing and

proposed underground mining operations. One station of interest is located centrally relative to the coal-mining crescent, another at the southeast end of the Book Cliffs, and the third at the southwest end of the Wasatch Plateau. These stations were essential in the final analysis of the Crandall Canyon event, and the quality of seismic coverage would decrease if they were not maintained in their present general locations. The total cost of acquiring the three stations is estimated at \$110,000 with on-going maintenance costs of about \$5,000 per year for the three stations.

In addition, monitoring of mining-induced seismicity (MIS) would be greatly enhanced by adding above-mine digital accelerographs linked by continuous telemetry to the UUSS for selected active mines. This would require the cooperation and active support of mine owners. The initial cost of installation is approximately \$15,000 each with installation/implementation costs of a few thousand dollars and some financial support for on-going maintenance for the duration of mining. This "minimalist" approach could be supported, in part, through research funds provided by RIMSP. On-going maintenance could be provided, (in-part) by the cooperating mine owners as is currently being done at three mines.

Questions are frequently raised concerning how seismic monitoring can benefit routine mining operations. In past months and years, operators have developed interpretations of the seismic record relative to their own mining operations. Correlation of magnitude and frequency of MIS with the depth of cut and/or advance rate may provide a feed-back loop for optimization of longwall operations. Comparison of MIS produced by past pillaring operations with current levels may provide a key to identifying abnormally stressed pillars. There are many possibilities. Correlating mining activity with MIS and appropriate data processing and presentation of data in a meaningful context for mine operators is what is needed. Projects dealing with these topics could be appropriately funded under the RIMSP concept.

The initial cost to the State would be a one-time expenditure of \$110,000 and ongoing costs of several thousand dollars which could be added to the existing University of Utah Seismograph Stations budget. A more definitive estimate for ongoing costs can be prepared if this recommendations is adopted.

4) Organizing a technical meeting (symposium) focusing on causes of mountain bumps and best practices for improving safety.

Potential topics could include:

- Improved safety training focusing on recognition of conditions contributing to bumps;
- Methods currently in use to reduce likelihood of damaging bumps;
- Summaries and lessons learned from past events;
- Strengths and limitations in pillar design procedures and mine layout practices;
- Remaining Utah coal resources and probable future coal mining conditions;
- Opportunities for industry, MSHA, NIOSH, BLM, and academia to work together on research designed to improve safety and productivity in Utah coal mines (development of theory, laboratory investigation, and field verification); and

The present and possible roles of government agencies in assuring safety in bump-prone coal mines.

The meeting would be presented under the auspices of the Utah Mine Safety Commission. The date should be spring or early summer of 2008. The Commission should appoint an organizing committee to select speakers, arrange a suitable location and duration for the event, identify sponsors/stakeholders, and record and publish the information presented. The prime focus of the symposium should be on improving safety in mines with a secondary focus on optimizing remaining coal resource recovery and strengthening the mining component of the Central Utah economy.

It is likely that this recommendation can be implemented without additional state funds.

5) Identifying mining engineering education as an essential component of the existing state-wide Engineering Initiative. Recognizing that engineers are a critical element of economic growth and that engineering enrollments have been declining, the legislature has approved funds to hire faculty and improve facilities needed to encourage student enrollment and retention. These funds have not been used, in any substantial way, to improve mining engineering education. To help ensure an appropriate number of graduates to fill anticipated vacancies in the technical staffs of Utah mines, the Department of Mining Engineering at the University of Utah is seeking ways to expand its faculty by one position to the recommended level of six full-time professors. Inclusion of mining engineering in the Engineering Initiative would assist in achieving this goal.